NMAP

Software Developed by the National Centers For Environmental Prediction (NCEP) - NCEP Central Operations (NCO)

Training manual prepared exclusively for the National Weather Service River Forecast Centers by the NCEP Hydrometeorological Prediction Center (HPC) - Development Training Branch (DTB)

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I. Introduction

The hydrometeorological forecast process has been redefined by directive from the National Weather Service (NWS) Director.

By fall of 2000 HPC will provide QPFs to the RFCs east of the continental divide in place of the WFOs. In order to maintain efficiency in the hydrometeorological forecast process while facilitating an optimal environment for coordination between the RFCs and HPC, NMAP has been chosen to replace HAS QPF as "the" QPF generation and modification software at the RFCs.

HPC has historically been utilizing NMAP as its operational product generation software package and therefore has been tasked to provide training to its partners in the participating NWS RFCs.

This manual is intended to be used as an aid to participating RFC staff utilizing NMAP to modify and grid HPC QPF (which is then used as input by the RFC's hydrologic model).

NMAP is designed for NCEP centers (AWC, HPC, MPC, SPC, TPC) whose primary product suite is graphical. Therefore, NMAP has both "display" and "product generation" capabilities.

The "display capabilities" include the ability to display observational and prognostic data as well as those graphical products generated using NMAP's "product generation" capability.

However, the primary function of NMAP at the RFCs will be product generation. Therefore, many of NMAPs display capabilities will not be utilized operationally during QPF composition at an RFC.

AN UPDATED VERSION OF THIS MANUAL IS AVAILABLE ON LINE AT http://www.hpc.ncep.noaa.gov/rfc/rfcnmap.wpd

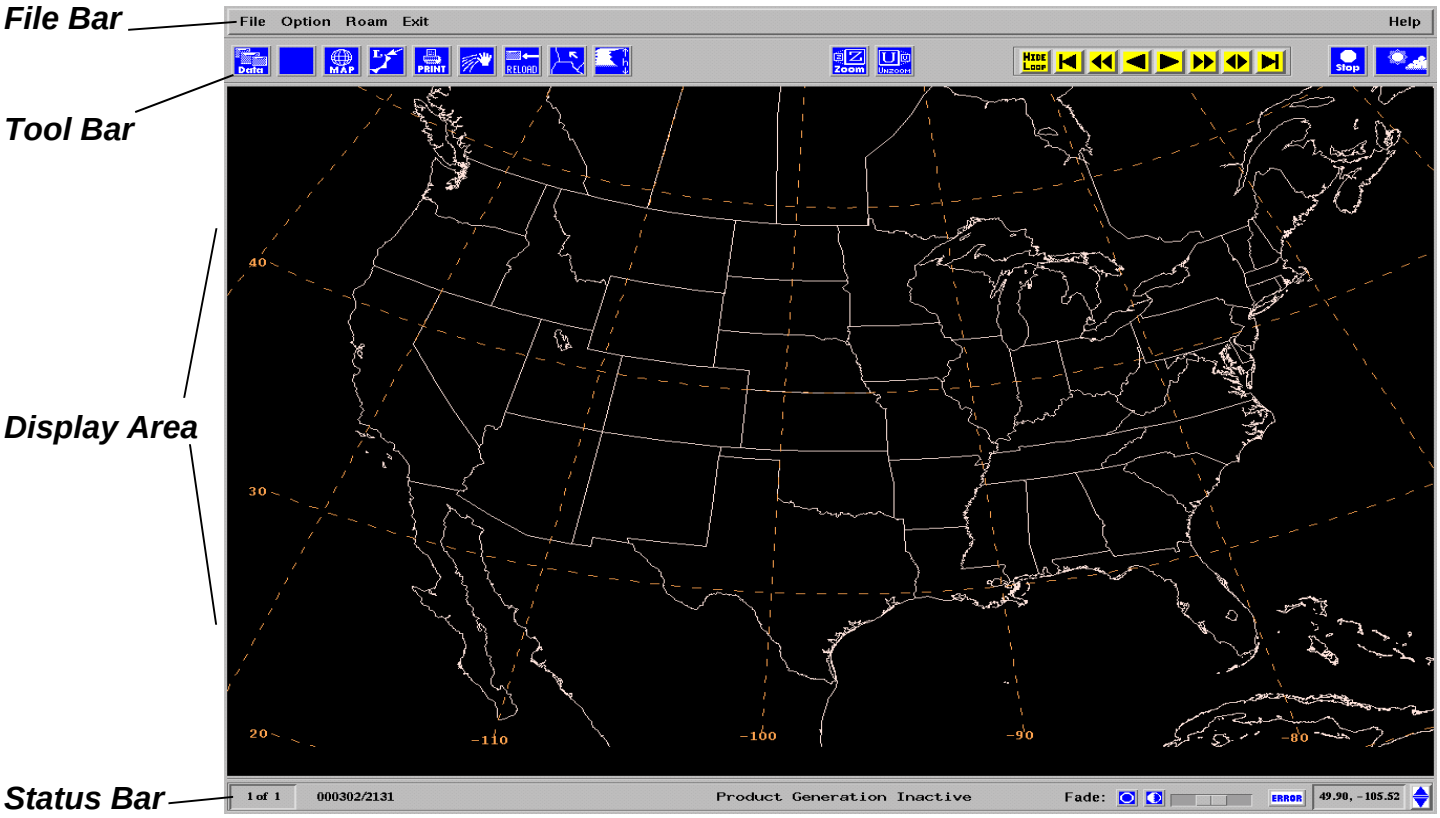
II. Software Mechanics

A. Launching NMAP

NMAP at the RFCs has been set up to be launched by simply typing in a terminal window `runnmap`. An NMAP window should then appear.

B. Orientation

Orientating yourself on this window is important. Note that the NMAP window is parsed into 4 parts: the FILE BAR, the TOOL BAR, the DISPLAY AREA, and the STATUS BAR.



The **FILE BAR** has 5 selections, only 2 of which are mandatory for the RFC to utilize.

FILE:	Enables data display functionality	
OPTION:	Allows the setting of preferences	
ROAM:	Enables a panning function	*(mandatory use at RFC)*
EXIT:	Closes the NMAP window	*(mandatory use at RFC)*
HELP:	Provides a terse overview of NMAP.	

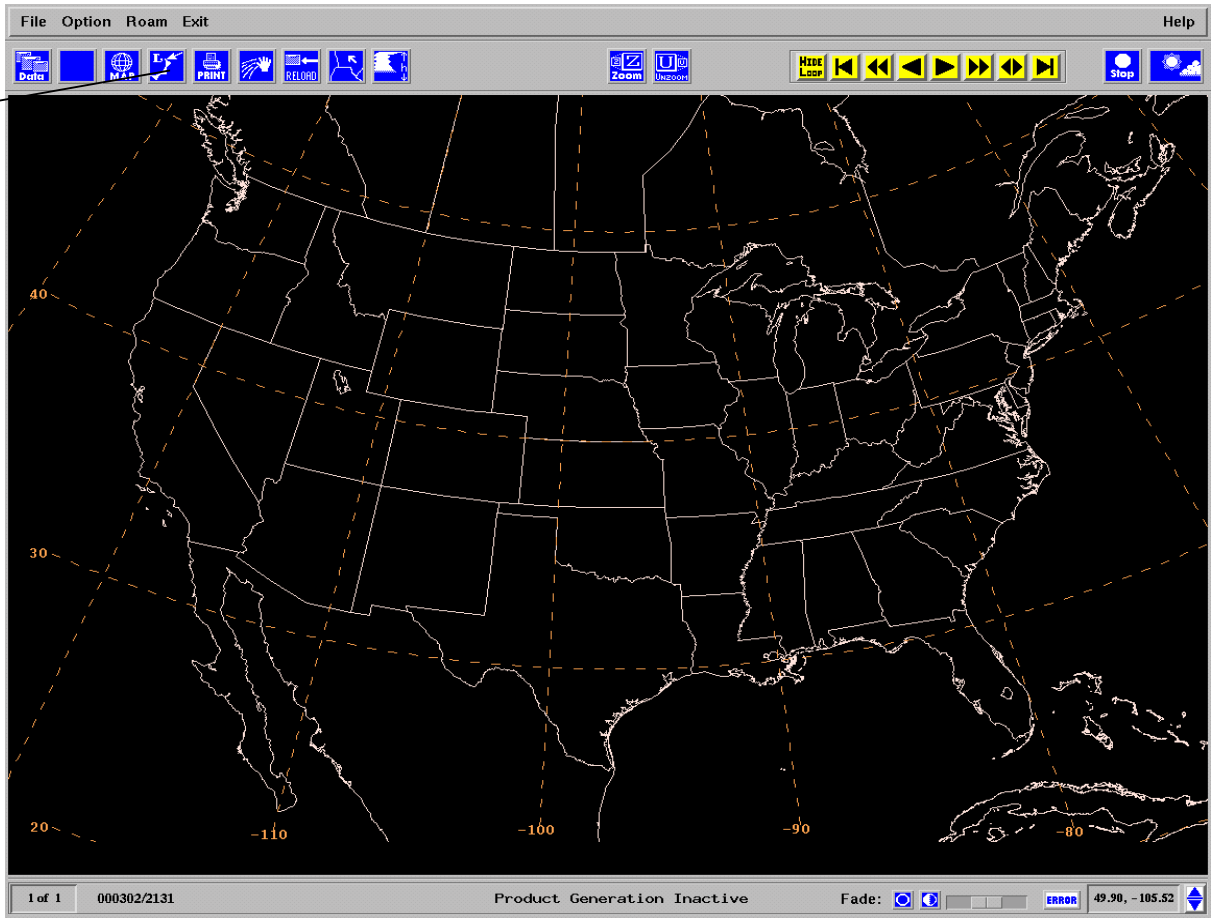
The **TOOL BAR** has 4 groups of buttons. The first (9 blue buttons) are used for data display/product generation. The next group (2 blue buttons) facilitate zoom/unzoom capability. The group of 8 yellow buttons allow looping of gridded data (or images); and the second to last blue button allows the user to manually halt the loading of data. The last button is just an animation of a cloud passing by the sun indicating that NMAP is processing data.

The **STATUS BAR** has 7 sections: **1)** Frame Counter, **2)** Current Date/Time in UTC, **3)** Product Generation File Name **4)** Product Generation Tips, **5)** Image Fade Tool, **6)** Error Status, **7)** Cursor Sampling Information. *The **5)** Fade Tool will not be utilized at the RFC.*

C. Product Generation Mode

If you recall, NMAP has two main capabilities, *display* and *product generation*. Since the full display capabilities of NMAP will NOT be utilized at the RFC, we will start off by describing product generation.

Click the PRODUCT GENERATION button to enable product generation.



A new menu will appear on the left side of the screen..this is an ACTION palette and is split into 3 sections

1. How to access objects on the screen (singularly or as a group). An OBJECT is a front, line, contour, or text object that you draw or create on the DISPLAY AREA.

2. This part of the menu allows you to open/save files containing objects as well as SELECT, MOVE, MODIFY and DELETE objects you place on the screen.

3. This part of the menu allows you to select what CLASS of object to generate or modify. The ONLY classes you will use are LINES, TEXT, and PROD.

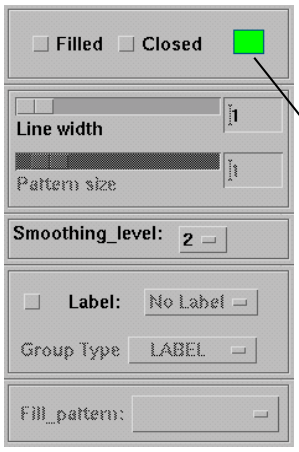
II. Software Mechanics (continued)

C. Product Generation Mode (continued)

1. Drawing a Contour

To draw a contour click the LINES class....

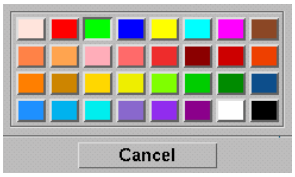
and the ACTION palette will expand to show all the different LINE OBJECTS you can draw.



You will only be using ONE at the RFC...click the CONTOUR button and an attribute window will display

This allows you to change the attributes of the contour you are about to draw (closed or filled contour, contour width/pattern, smoothing level, label of contour).

If you want to change the color of the line, click the color box and the COLOR PALETTE will appear.

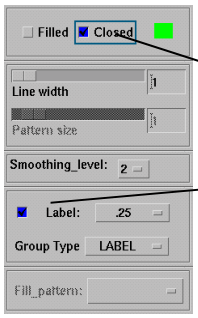


Choose the color you want and this color palette will disappear.

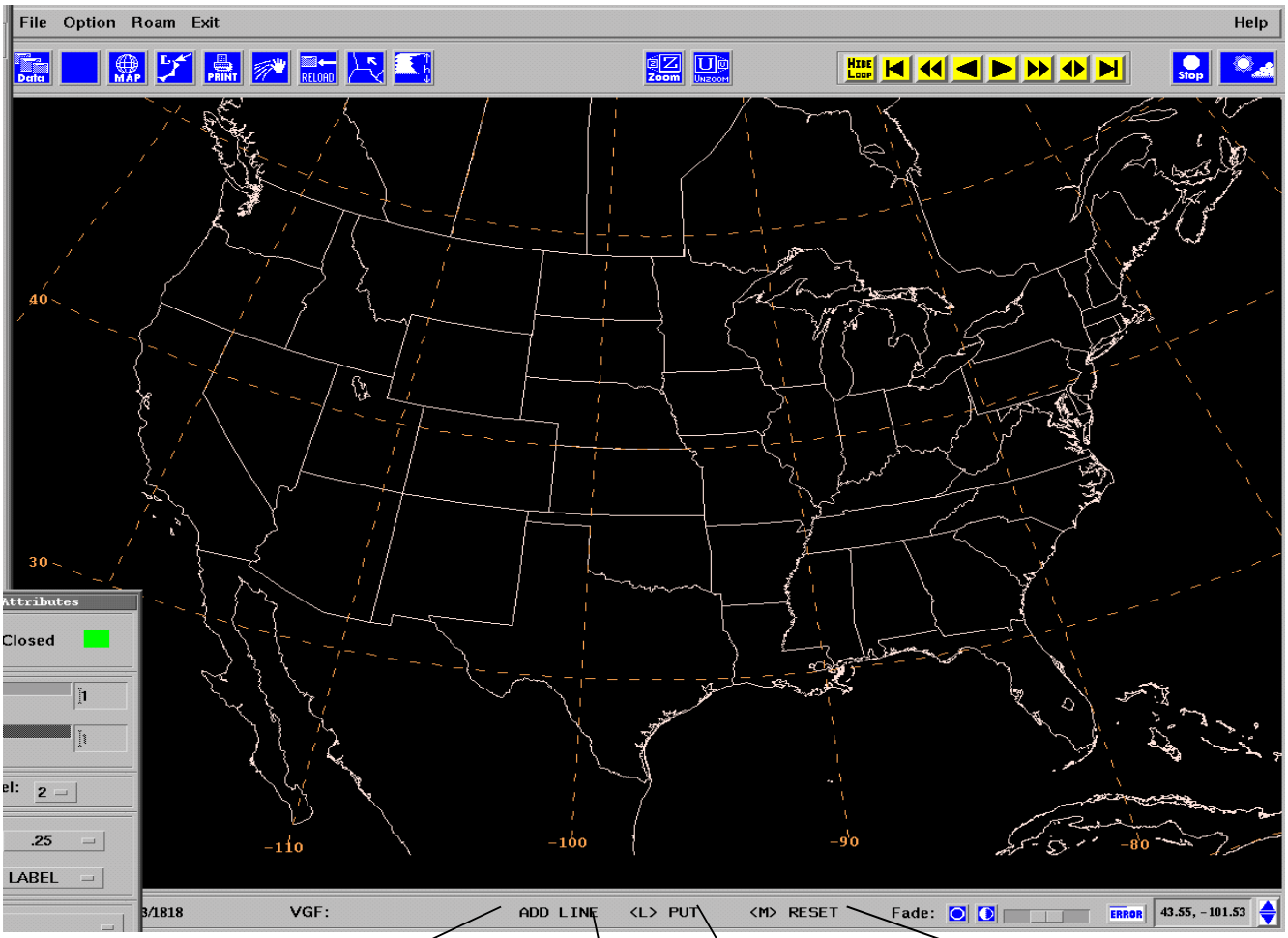
II. Software Mechanics (continued)

C. Product Generation Mode (continued)

2. Drawing a Contour (continued)



To draw a closed contour labeled .25 click CLOSED, then click LABEL and then select .25" for a label. If you wanted the label to be something other than .25, click the value .25 and a list pops up allowing you to select or enter a value. ***If you do not draw contours in "closed" mode, be sure the lines extend beyond the QPF grid domain.***



NOTICE NMAP WILL HELP DIRECT YOU AS TO WHAT MOUSE FUNCTIONS ARE VALID FOR CONTOURS

Look at the PRODUCT GENERATION TIPS

It indicates what you are trying to do (add a line)

Followed by which mouse button to click on the DISPLAY AREA to initiate drawing of contours (clicking the left button). Move your mouse and click the left mouse button to draw the contour. Left clicking adds vertices to the line which NMAP will use to draw a closed contour (in the interim NMAP draws a closed contour based on what vertices have been placed so far).

When you are done, middle click the mouse button to close the contour and place the contour label.

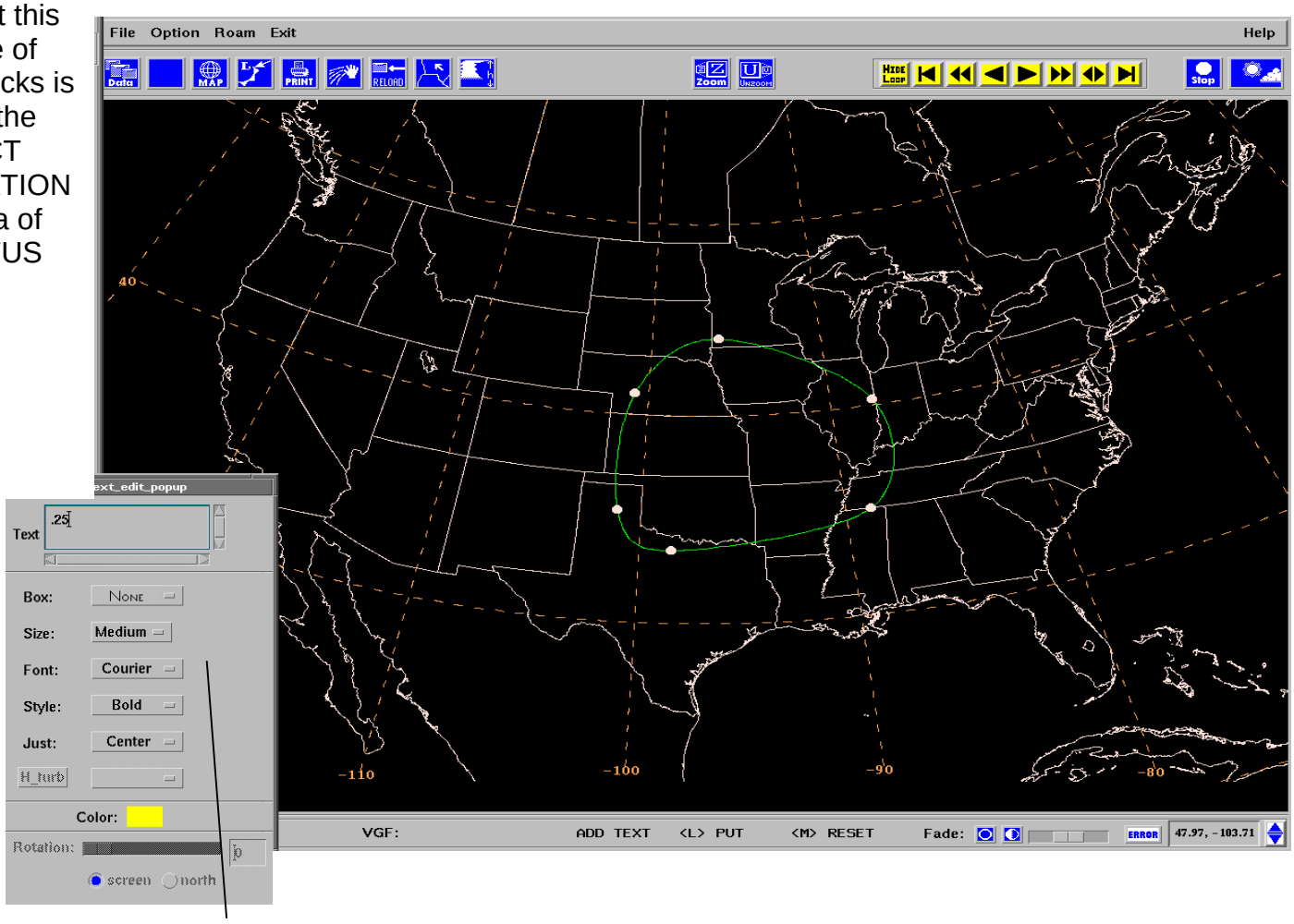
II. Software Mechanics (continued)

C. Product Generation Mode (continued)

3. Placing the label

Notice that after you close the contour of your line NMAP automatically prompts you to place the label. The mouse cursor has an outline of a box indicating where the LABEL you specified will be placed. To place the label, simply move the cursor to where you want the label to be placed and click once with the LEFT mouse button.

(Note that this sequence of mouse clicks is given on the PRODUCT GENERATION TIPS area of the STATUS BAR).



You also change the attributes of the label by adjusting the default settings in the associated attribute pop-up window.

Be sure not to perform a "double middle click" prior to the placement of the label as this will remove the ability to place labels for that line. If this is the case, you will have to redraw the line

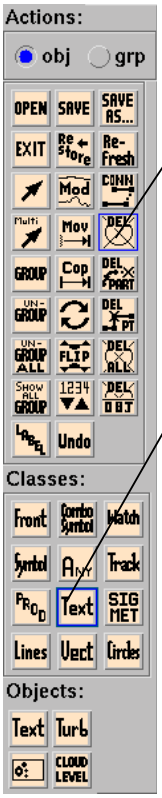
REMINDER: LABELS (TEXT) AND CONTOURS (LINES) ARE REFERRED TO AS "OBJECTS"

II. Software Mechanics (continued)

C. Product Generation Mode (continued)

4. Deleting Objects

To delete an object (contour or label) click DEL ...



and then click what CLASS of object you want to delete (select ONE: LINES or TEXT. You can not delete both at the same time)

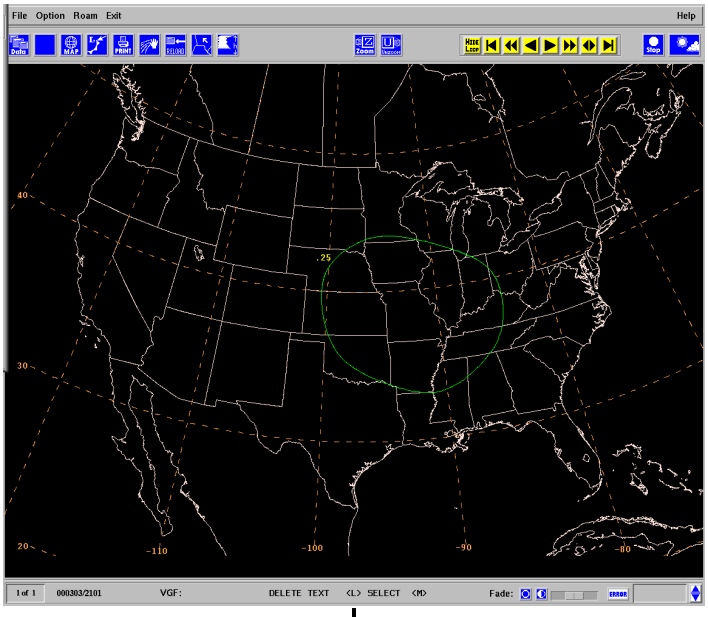
For this example we will delete the text label.

After specifying which CLASS of object to delete (for this case it's TEXT), on the DISPLAY AREA select the TEXT LABEL with a left mouse click.

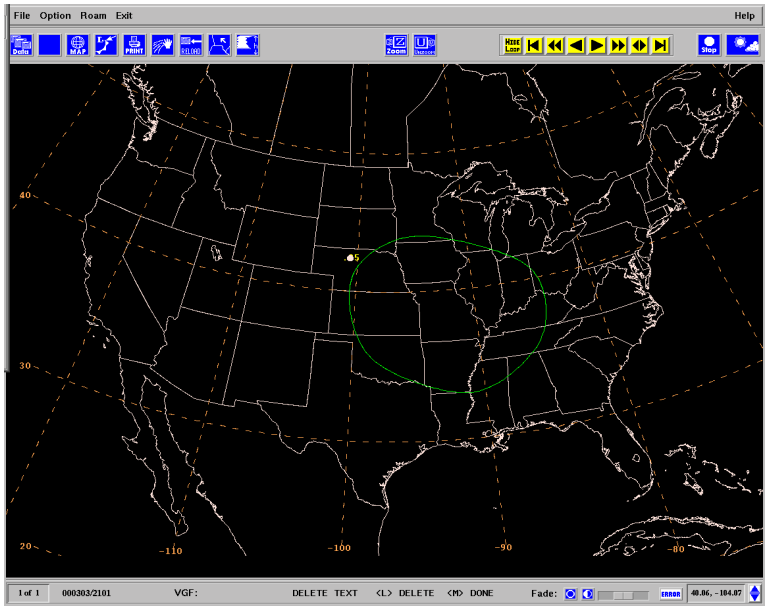
Once selected, click the left mouse button again once to delete the label.

Exit DELETE MODE by clicking the middle mouse button.

This same process is used to delete lines.



Notice the PRODUCT GENERATION TIPS area on the STATUS BAR. It first prompts you to use the mouse button to select the TEXT...



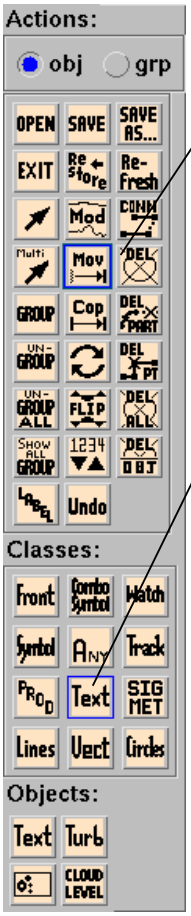
AND then once it's selected (as indicated by the white dot), click the left mouse button again to delete.

II. Software Mechanics (continued)

C. Product Generation Mode (continued)

5. Moving Objects

To move an object click MOV ...



and as before click what CLASS of object you want to move (select ONE lines or text...you can move multiple objects at the same time)

For this example we will move the text label.

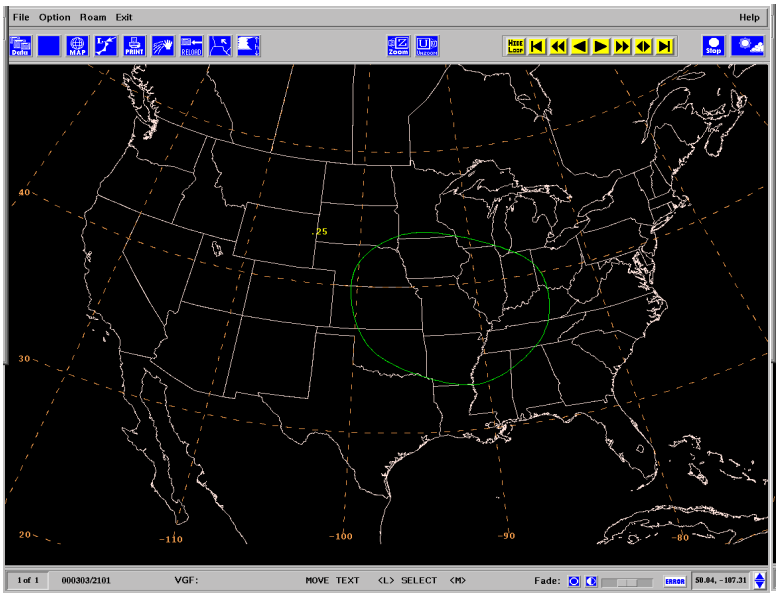
After specifying which CLASS of object to move (for this case its TEXT), on the DISPLAY AREA select the TEXT LABEL with a left mouse click.

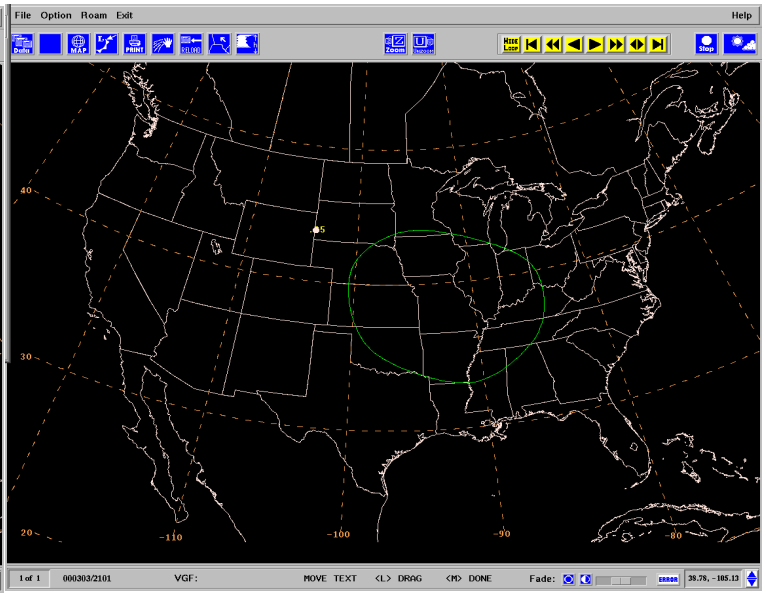
Once selected, drag (click and HOLD DOWN) the left mouse button while moving the mouse to move the label.

Deposit the label by releasing the left mouse button.

EXIT MOVE MODE by clicking the middle mouse button.

This same process is used to move lines.





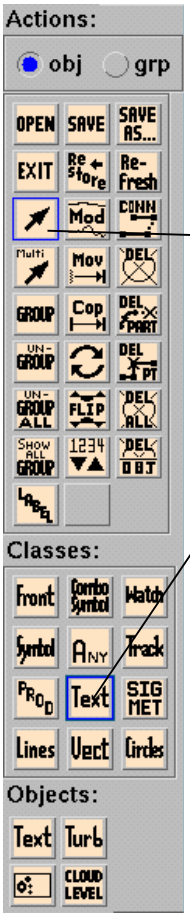
Notice the PRODUCT GENERATION TIPS area on the STATUS BAR. It first prompts you to use the mouse button to select the TEXT...

AND then once it's selected (as indicated by the white dot), drag the left mouse button to move the label. DEPOSIT the label by releasing the left mouse button.

II. Software Mechanics (continued)

C. Product Generation Mode (continued)

6. Modifying Objects - ATTRIBUTES



The simplest method to modify an object is to click the SELECT button and then click which class of object you want to modify.

For this example we will modify TEXT.

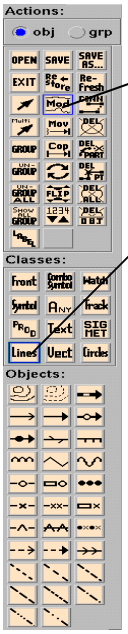
Click the SELECT BUTTON
Click the TEXT button

(Now use the Product Generation Tips AREA on the STATUS BAR to guide your mouse sequence)

SELECT THE TEXT you want to modify by left clicking once. The TEXT object's attributes will appear in the familiar pop-up window on the bottom left part of the screen. Adjust the available settings in the pop-up window and then click APPLY to invoke your new attributes.

The same process is used for line attributes. IN ADDITION you can also adjust the location of the line's vertices by dragging the vertices with the left mouse button (click and hold the left mouse button down while moving the mouse).

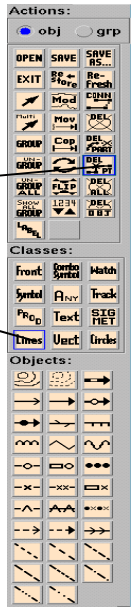
7. Modifying Objects - Adding/Deleting Line Vertices



To add more vertices to a line click the MOD button and then click LINE

Move your cursor on the DISPLAY AREA to where you want to add more vertices in a line...and just as if you were drawing a contour (as before) left click and move your mouse.

Exit MOD mode by middle clicking the mouse button.



To delete vertices click DEL PT and then click LINE.

Select the vertex on the line you want to delete with a left mouse click (the selected vertex will turn red). Left click again to confirm the delete.

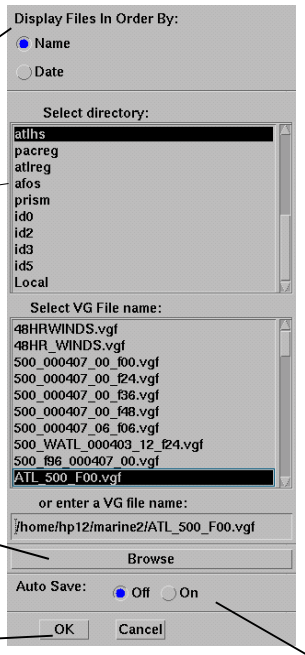
Exit DEL PT mode by middle clicking the mouse button.

II. Software Mechanics (continued)

C. Product Generation Mode (continued)

8. Saving your Work

To Save your work click SAVE AS



And a new window pops up.

A list of users is displayed

Enter a name to save your work and it MUST END IN .VGF. For example `test.vgf`

Enter file names here.

You can also specify which directory to place these files by using the BROWSE button.

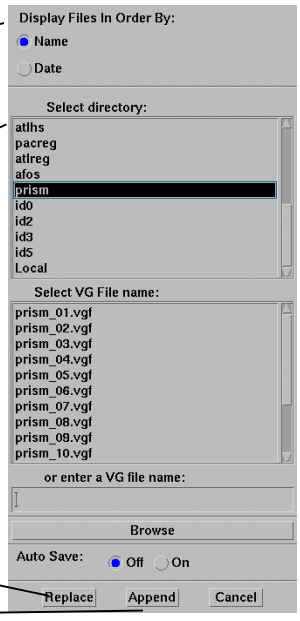
When your done click OK.

NOTE THE AUTO SAVE FUNCTION. CLICKING THIS "ON" AUTO SAVES THE FILE YOU ARE WORKING ON EVERY 5 MINUTES.

Once you have used SAVE AS, you can then hit SAVE if resaving is needed.

9. Opening Files for editing

To OPEN a previously saved file...click OPEN



And a new window pops up listing all the available files to open.

A list of user directories will be displayed.

Click the file name you want and it will appear HERE

Now click either REPLACE (to replace what's being edited in the DISPLAY AREA) or click APPEND to add to the file currently being edited on screen. MOST TIMES YOU WILL BE CLICKING REPLACE.

II. Software Mechanics (continued)

C. Product Generation Mode (continued)
10. EXITING PRODUCT GENERATION

To exit PRODUCT GENERATION click EXIT

II. Software Mechanics (continued)

D. Display Mode

1. Introduction

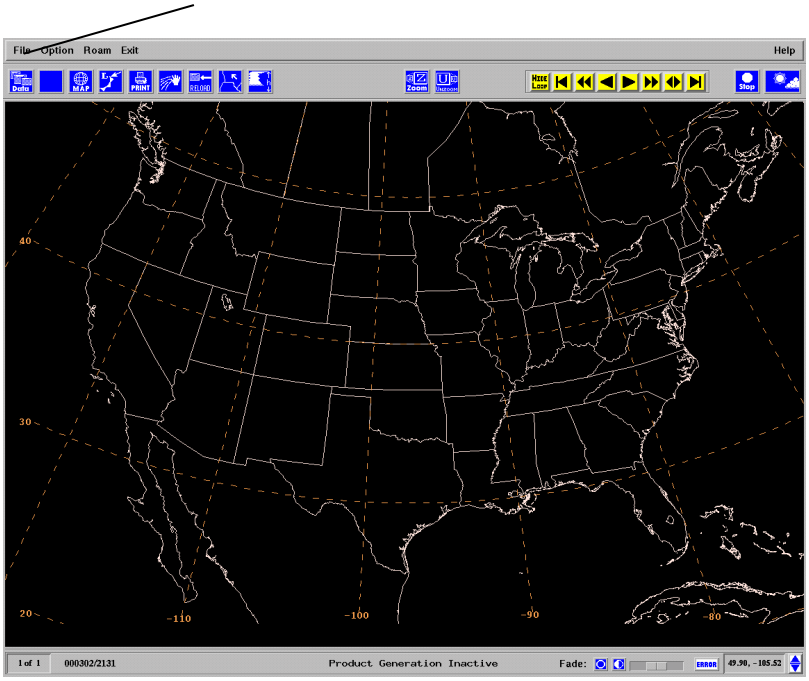
If you recall, NMAP has 2 modes..PRODUCT GENERATION and DISPLAY MODE. The DISPLAY MODE of NMAP is very versatile at NCEP. It is typically utilized to display a wide variety of both observational and model data. However, only a small portion of its full capabilities will be needed at an RFC.

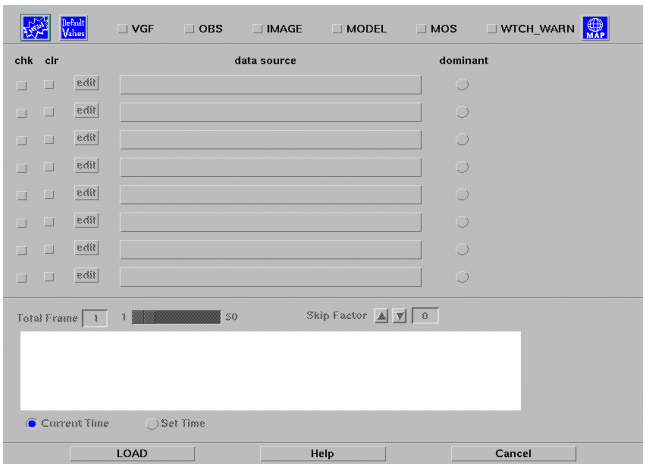
The only kind of data that you will likely display at the RFC are those files or grids either created by HPC or an RFC. These files are in VECTOR GRAPHIC FORMAT and are typically stored with a .vgf extension to the file name.

LOADING VGF FILES IN DISPLAY MODE WILL NOT ALLOW YOU TO EDIT THE VGF FILE. IT MERELY ALLOWS YOU TO VIEW THE DATA AS A BACKGROUND MAP.

There are 2 methods to invoke DATA DISPLAY MODE.

1. Click FILE then select DATA SOURCE





T he FRAMES DEFINITION SET BOX will appear

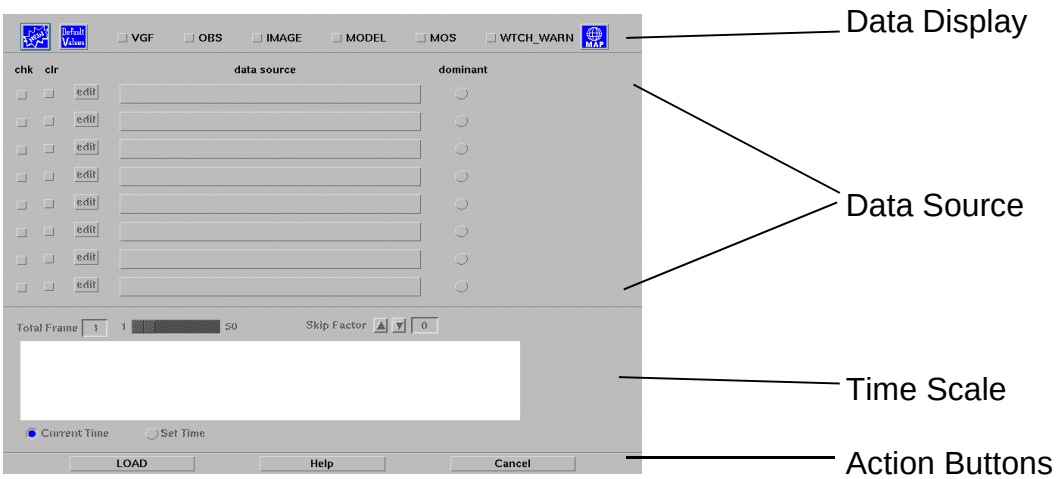
2. Move your mouse over the DISPLAY AREA and right click once and this will IMMEDIATELY display the FRAMES DEFINITION SET BOX. (This method is a toggle such that right clicking over the DISPLAY AREA again will REMOVE the FRAMES DEFINITION SET BOX).

II. Software Mechanics (continued)

D. Display Mode (continued)

1. Introduction (continued)

The FRAMES DEFINITION SET BOX is split into 4 areas



The DATA DISPLAY AREA allows you to select what kind of data to display (for the RFC the two valid types of DATA will be VGF and MODEL) as well as resetting the selections and adjusting the map background.

The DATA SOURCE area allows you to specify file names of data to display. (Note up to 8 data sources are allowed to be displayed at one time).

The TIME SCALE AREA allow you to peruse which times the grids you create are available for viewing .

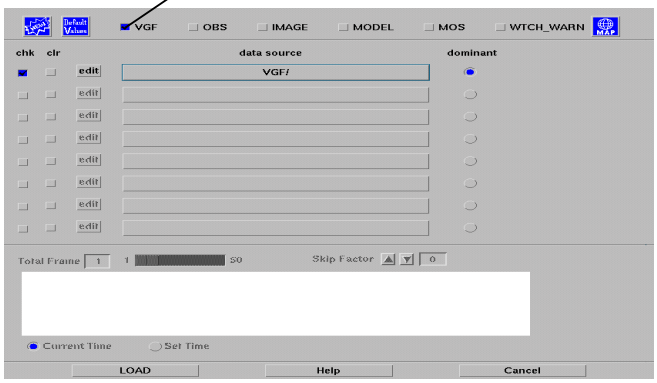
The ACTION BUTTONS allow you to invoke or cancel your selections.

II. Software Mechanics (continued)

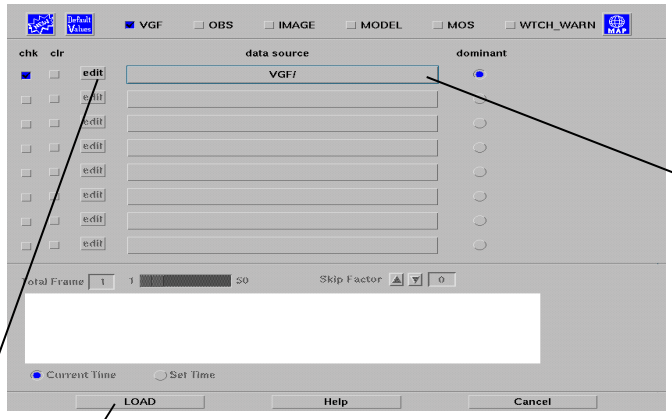
D. Display Mode (continued)

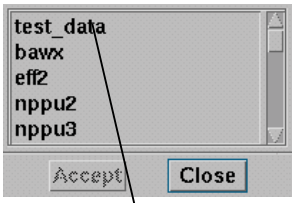
2. Displaying VGF files

Pull up the FRAMES DEFINITION SET BOX and select VGF



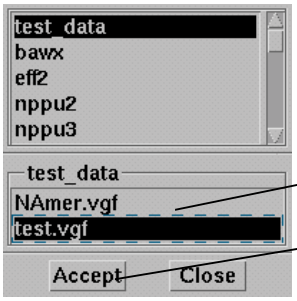
The first DATA SOURCE BOX in the DATA SOURCE AREA will indicate VGF and a small directory box MAY show up.





(If it does NOT click the DATA SOURCE BOX to do so)

This directory box allows you to browse user directories to select specific VGF files for display. Click on these names to browse for any VGF files to display.

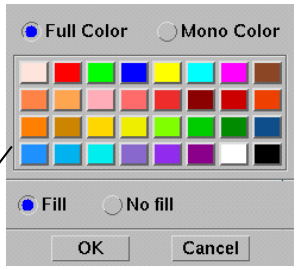


Once you have selected a machine name, at the VERY BOTTOM of the user list appears a listing of available VGF files.

Click a name and then click ACCEPT and all the pop ups disappear

The file will not load until you click LOAD.

You also have the option of loading the VGF file in MONOCHROME color by clicking EDIT. A color palette appears allowing you to select which color to display the file.

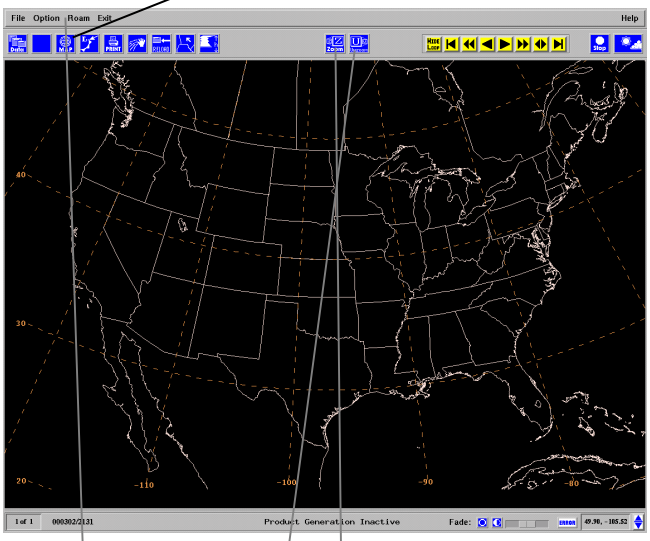


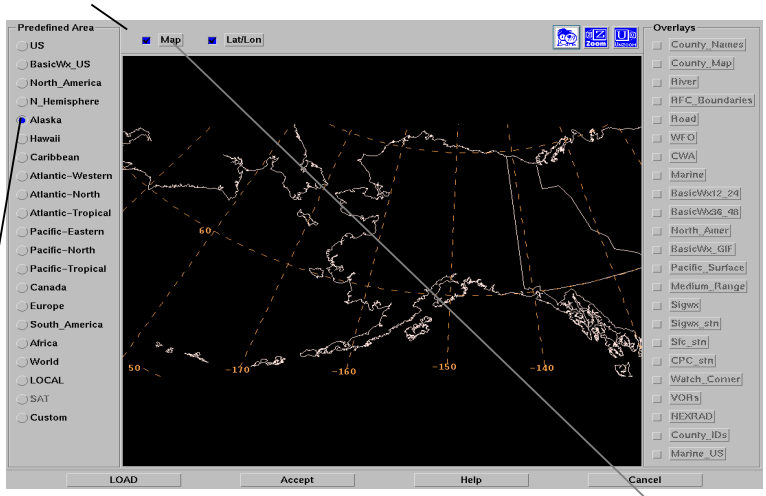
II. Software Mechanics (continued)

D. Display Mode (continued)

3. Changing the Map Background, ZOOMING, and ROAMING

To change the MAP BACKGROUND click the MAP button.





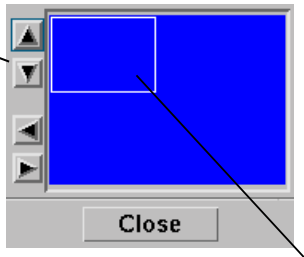
A new window will appear. Select what map you want to display by clicking the circle next to the map name. Change the attributes of the map itself by clicking the MAP BUTTON.

Click ACCEPT to accept the new map background or CANCEL to cancel the selection.

To ZOOM in on an area on the map click the ZOOM button. The cursor changes to cross hair. Draw a ZOOM BOX by DRAGGING with the left mouse button a box on the DISPLAY AREA. Release the button when you are done.

UNZOOM (and revert back to your original zoom factor) by clicking UNZOOM.

ROAMING is an NMAP feature that allows you to ZOOM and pan at the same time. Click ROAM ON THE FILE BAR and a smaller window will pop up. This is the ROAM BOX.



Use the ROAM box to pan around the map by moving your mouse TO the sub-box drawn on the ROAM BOX (which represents your viewable area). DRAG the left mouse button over the blue area and note how your DISPLAY area reacts.

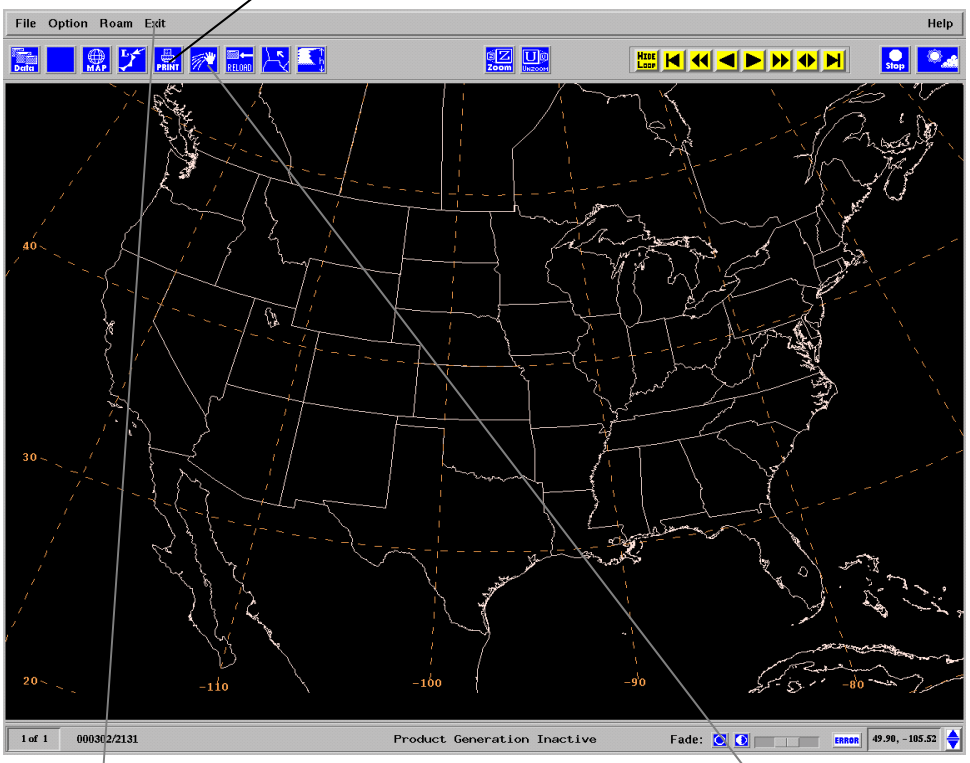
To get back to normal, select ROAM and then FIT TO SCREEN. A combination of ZOOM with ROAM allows you the ability to view data on a very small scale.

II. Software Mechanics (continued)

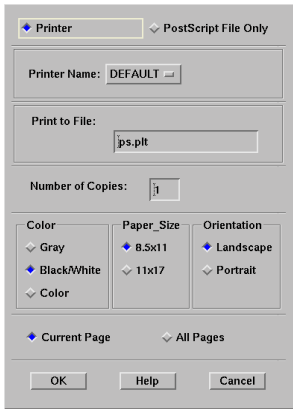
D. Display Mode (continued)

4. Printing and Clearing the Display Area

To print the contents of the DISPLAY AREA click the PRINT BUTTON



A fairly typical print dialog box will appear allowing you to print in color, grey shades, or black and white. This will also allow you to select which printer to print to and the size of paper to print upon.



You can also “print” the screen to a post script file.

To Clear the DISPLAY AREA click the WIPE BUTTON

5. Exiting NMAP

YOU SHOULD ALWAYS BE OUT OF PRODUCT GENERATION MODE BEFORE EXITING NMAP. Once you are out of PRODUCT GENERATION MODE, click the EXIT Button to exit.

III. Graph to Grid

A. Introduction

"Graph to Grid" is the algorithm used to convert contours stored in a VGF file into a gridded field. This is a function built into NMAP and is accessed only through PRODUCT GENERATION MODE.

"Graph to Grid" is EXACTLY like the WYSIWYG algorithm utilized in WINQPF and HASQPF EXCEPT that it does not "cap" a maximum value in a grid given by the maximum contour value drawn by a forecaster. Rather, it "peaks" a maximum value based on the gradient between the last 2 contours drawn. This method can yield drastically different results for maximum values compared to that which would be obtained by WINQPF or HASQPF. It is suggested that forecasters experiment with GRAPH to GRID on their off time in order to gain experience with the algorithm.

B. Utilized Files

"Graph to Grid" relies on a specific file naming convention of VGF files to create a gridded field. These files have the format **qpf**_**p**??**i**_yyyymmddcc**f**hhh**.vgf** where

The bold characters in the above template are LITERAL characters and are REQUIRED in the file name.

?? Is the 2 digit duration of the QPF forecast period. Example: 06 for 6 hour QPF or 12 for 12 hour QPF.

yyyy is the 4 digit year (2000)

mm is the 2 digit month (03 12 etc)

dd is the 2 digit day of the month (01 30 etc)

cc is the 2 digit cycle (00 06 12 18)

hhh is the 3 digit valid forecast hour (000 024 120 etc)

For example qpf_p06i_2000020900f072.vgf is a VGF file holding the 6 hour accumulated precipitation forecast ending at forecast hour 72 referenced from 00Z Feb 9, 2000.

When using GRAPH TO GRID, it is assumed that you are modifying a VGF file that was named using the above convention.

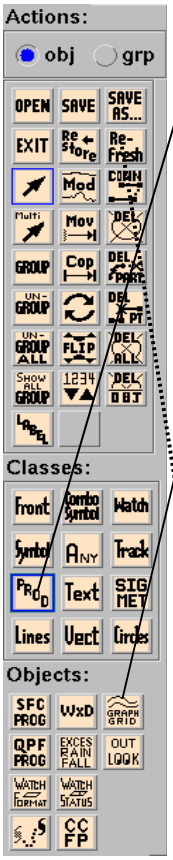
C. ZERO QPFS

If no QPF is expected in your 6 hour period, DO NOT use any contours within your domain area. Just click the "Graph to Grid" button (see next section for details).

III. Graph to Grid (continued)

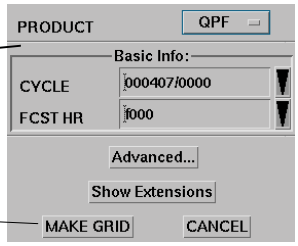
C. Mechanics

In PRODUCT GENERATION MODE click PROD then click GRAPH TO GRID.

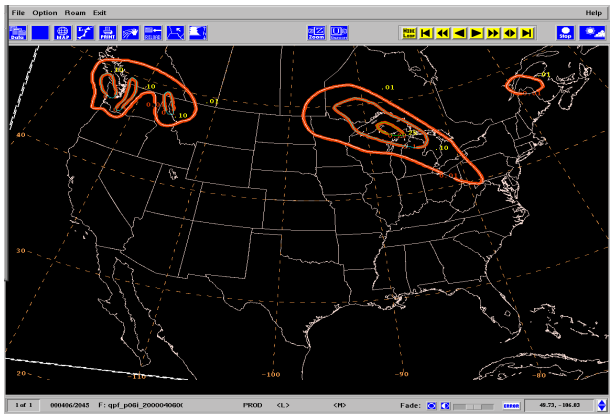


A small pop up window appears with defaults based on the name of the VGF file currently being edited.

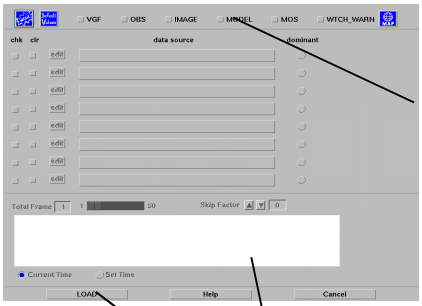
Now click MAKE GRID



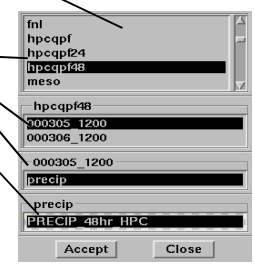
The cursor on the DISPLAY AREA will change to a white X letting you know that the algorithm is working..and will revert back to the normal red arrow when the algorithm is done. The contours that you drew will be outlined in a HEAVY OUTLINE indicating the results of your GRAPH TO GRID.



A file that holds the gridded data has been created using the same naming conv ention but with a .grd extension (instead of .vgf). Remove the GRAPH TO GRID box by clicking CANCEL. To remove the heavy contours from image, hit REFRESH.

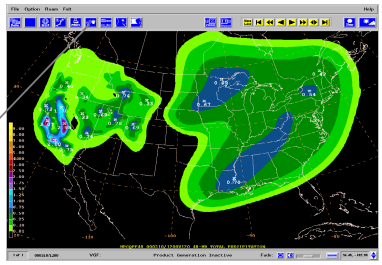


At this point you are free to view the contents of the grid file. This NMAP session should be utilized for DISPLAY MODE. Therefore, following the instructions from SECTION II - D - 1, pull up the FRAMES DEFINITION BOX and select MODEL. When the new pop up displays, search for where your gridded data lies (the default should be `MODEL/f-rfc/*/precip/PRECIP_6HR`). Click the following boxes until you see the appropriate grid name. Then Click ACCEPT.

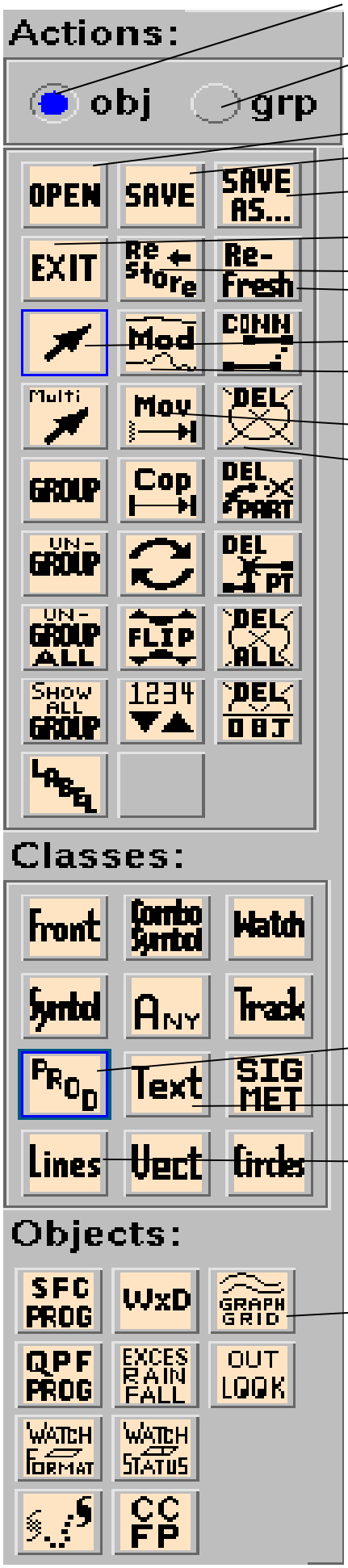


Now Select the QPF you want to see by adjusting the time line.

Now Click LOAD and the results of your image will display. Once loaded, subsequent GRAPH TO GRID results can be viewed by simply clicking RELOAD on the TOOL BAR.



IV. Product Generation Button Quick Reference



Treat similar objects on screen individually or as a group

Open,
save,
(or save as) VGF files

Exit NMAP,
Restore last saved file into product generation
Refresh screen

Select Button
Modify button (for lines)

Move an object
Delete an object

Invoke GRAPH TO GRID palette (below)

Invoke action for TEXT objects or

...LINE objects

GRAPH TO GRID the current contoured field

V. Typical NMAP operational mechanical

sequence

1. Load NMAP on left screen

2. View HPC QPF on RFC scale

3. Enter product generation

4. Load HPC vgf files (with any associated background maps)

5. Modify HPC contours as needed

6. Graph to grid contours

7. OPTIONAL : Verify graph to grid output by loading grid in DATA DISPLAY MODE on right screen NMAP. (Use RELOAD for subsequent checks).

8. Save vgf files, exit Product Generation

9. Exit NMAP

VI. Troubleshooting

Problem: **"**When I enter product generation I get the message 'Unable to invoke PRODUCT GENERATION'"

Solution: Be sure there is only one instance of NMAP in PRODUCT GENERATION mode. Otherwise, from a terminal window run the script that invokes the `cleanvgf` script (see your DOH for help with this).

Problem: Graph to Grid has produced a starburst pattern

Solution: Be sure all the contours you drew are closed. If need be, delete the contours AND text labels and start over.

Problem: **"**Graph to Grid is not giving me any results"

Solution: If Graph to Grid is not giving you any results, it may be that all the contours lie outside of your RFC BOX (the box that outlines your RFC Basin). You may need to add more contours. OR you have not drawn any contours on the display area yet.

Problem: **"**Graph to Grid is not changing the results from the last time it was ran"

Solution: Did you RELOAD your results ? If you did, you may need to add more contours.

Problem: **"**Graph to Grid is not giving me the result I wanted."

Solution: You may need to add more contours.

- If your peak value is too high add an additional contour JUST inside the max contour that is one hundredth (.01) higher than the max contour.
- If you have only drawn a zero line and a max contour (or very few contours), add intermediate contours to adjust the gradient.

Problem: "An example of the problem I'm having is not on this page".

Solution: Using the table below, identify what kind of problem it is and then contact the appropriate personnel. ***If its an AWIPS problem utilize your normal AWIPS troubleshooting procedures.***

WHO TO CALL **(contact numbers are in section VI)**	
PROBLEM TYPE	***CONTACT***
NMAP - SYSTEM ADMIN	ABRFC
NMAP - SOFTWARE MECHANICS	HPC/DTB
NMAP - GENERAL QUESTIONS	ABRFC or HPC/DTB

VII. Points of Contact

WHO TO CALL	
PROBLEM TYPE	***CONTACT***
NMAP - SYSTEM ADMIN	ABRFC
NMAP - SOFTWARE MECHANICS	HPC/DTB
NMAP - GENERAL QUESTIONS	ABRFC or HPC/DTB

ABRFC CONTACT		
NAME	***PHONE***	***EMAIL***
Bill Lawrence	918 832 4110	bill.lawrence@noaa.gov

HPC/DTB CONTACTS		
NAME	***PHONE***	***EMAIL***
Joe Carr	301 763 8000 X 7353	joe.carr@noaa.gov
Steve Listemaa	301 763 8000 x 7367	steve.listemaa@noaa.gov
Pete Manousos	301 763 8000 x 7307	peter.manousos@noaa.gov
Brett McDonald	301 763 8000 x 7365	brett.mcdonald@noaa.gov
HPC OPERATIONS (24 HOUR)	301 763 8201	Use this number if you can't get us on our extensions